

What is claimed:

1. A composition which comprises an admixture of two compounds, wherein: (a) one compound is an antibody or portion thereof which binds to a CCR5 receptor; and (b) one compound retards gp41 from adopting a conformation capable of mediating fusion of HIV-1 to a CD4+ cell by binding noncovalently to an epitope on a gp41 fusion intermediate; wherein the relative mass ratio of the compounds in the admixture ranges from about 100:1 to about 1:100, the composition being effective to inhibit HIV-1 infection of the CD4+ cell.
2. A composition which comprises an admixture of three compounds, wherein: (a) one compound is an antibody or portion thereof which binds to a CCR5 receptor; (b) one compound retards attachment of HIV-1 to a CD4+ cell by retarding binding of HIV-1 gp120 envelope glycoprotein to CD4 on the surface of the CD4+ cell; and (c) one compound retards gp41 from adopting a conformation capable of mediating fusion of HIV-1 to a CD4+ cell by binding noncovalently to an epitope on a gp41 fusion intermediate; wherein the relative mass ratio of any two of the compounds in the admixture ranges from about 100:1 to about 1:100, the composition being effective to inhibit HIV-1 infection of the CD4+ cell.
3. ~~The composition of claim 2, wherein the compound which retards attachment of HIV-1 to the CD4+ cell by retarding binding of HIV-1 gp120 envelope glycoprotein to CD4 on the surface of the CD4+ cell is a CD4-based protein.~~

4. The composition of claim 3, wherein the CD4-based protein is a CD4-immunoglobulin fusion protein.
5. The composition of claim 4, wherein the CD4-immunoglobulin fusion protein is CD4-IgG2, wherein the CD4-IgG2 comprises two heavy chains and two light chains, wherein the heavy chains are encoded by an expression vector designated CD4-IgG2HC-pRcCMV (ATCC Accession No. 75193) and the light chains are encoded by an expression vector designated CD4-kLC-pRcCMV (ATCC Accession No. 75194).
6. The composition of claim 2, wherein the compound which retards attachment of HIV-1 to the CD4+ cell by retarding binding of HIV-1 gp120 envelope glycoprotein to CD4 on the surface of the CD4+ cell is a protein, the amino acid sequence of which comprises that of a protein found in HIV-1 as an envelope glycoprotein.
7. The composition of claim 6, wherein the protein binds to an epitope of CD4 on the surface of the CD4+ cell.
8. The composition of claim 7, wherein the envelope glycoprotein is selected from the group consisting of gp120, gp160, and gp140.
9. The composition of claim 2, wherein the compound which retards the attachment of HIV-1 to the CD4+ cell by retarding binding of HIV-1 gp120 envelope glycoprotein to CD4 on the surface of the CD4+ cell is an antibody or portion of an antibody.

10. The composition of claim 9, wherein the antibody is a monoclonal antibody.
- 5 11. The composition of claim 10, wherein the monoclonal antibody is a human, humanized or chimeric antibody.
12. The composition of claim 9, wherein the portion of the antibody is a Fab fragment of the antibody.
- 10 13. The composition of claim 9, wherein the portion of the antibody comprises the variable domain of the antibody.
14. The composition of claim 9, wherein the portion of the antibody comprises a CDR portion of the antibody.
- 15 15. The composition of claim 10, wherein the monoclonal antibody is an IgG, IgM, IgD, IgA, or IgE monoclonal antibody.
- 20 16. The composition of claim 10, wherein the monoclonal antibody binds to an HIV-1 envelope glycoprotein.
17. The composition of claim 16, wherein the HIV-1 envelope glycoprotein is selected from the group consisting of gp120 and gp160.
- 25 18. The composition of claim 16, wherein HIV-1 envelope glycoprotein is gp120 and the monoclonal antibody which binds to gp120 is IgG1b12 or F105.
- 30 19. The composition of claim 9, wherein the antibody binds to an epitope of CD4 on the surface of the CD4+ cell.

20. The composition of claim 2, wherein the compound which retards attachment of HIV-1 to the CD4+ cell by retarding binding of HIV-1 gp120 envelope glycoprotein to CD4 on the surface of the CD4+ cell is a peptide.
21. The composition of claim 2, wherein the compound which retards attachment of HIV-1 to the CD4+ cell by retarding binding of HIV-1 gp120 envelope glycoprotein to CD4 on the surface of the CD4+ cell is a nonpeptidyl agent.
22. The composition of claim 1 or 2, wherein the compound which retards gp41 from adopting a conformation capable of mediating fusion of HIV-1 to a CD4+ cell by binding noncovalently to an epitope on a gp41 fusion intermediate is an antibody.
23. The composition of claim 22, wherein the antibody is a monoclonal antibody.
24. The composition of claim 1 or 2, wherein the compound which retards gp41 from adopting a conformation capable of mediating fusion of HIV-1 to a CD4+ cell by binding noncovalently to an epitope on a gp41 fusion intermediate is a peptide.
25. The composition of claim 1 or 2, wherein the compound which retards gp41 from adopting a conformation capable of mediating fusion of HIV-1 to a CD4+ cell by binding noncovalently to an epitope on a gp41 fusion intermediate is a fusion protein which comprises a peptide selected from the group consisting of T-20 (SEQ

ID NO: 1), DP107 (SEQ ID NO: 2), N34 (SEQ ID NO: 3), C28 (SEQ ID NO: 4), N34(L6)C28 (SEQ ID NO: 5), and T-1249 (SEQ ID NO: 6).

- 5 26. The composition of claim 24, wherein the peptide is selected from the group consisting of T-20 (SEQ ID NO: 1), DP107 (SEQ ID NO: 2), N34 (SEQ ID NO: 3), C28 (SEQ ID NO: 4), N34(L6)C28 (SEQ ID NO: 5), and T-1249 (SEQ ID NO: 6).
- 10 27. The composition of claim 24, wherein the peptide is T-20 (SEQ ID NO: 1).
- 15 28. The composition of claim 1 or 2, wherein the compound which retards gp41 from adopting a conformation capable of mediating fusion of HIV-1 to a CD4+ cell by binding noncovalently to an epitope on a gp41 fusion intermediate is a non-peptidyl agent.
- 20 29. The composition of claim 1 or 2, wherein the antibody which binds to a CCR5 receptor is selected from the group consisting of PA8 (ATCC Accession No. HB-12605), PA10 (ATCC Accession No. 12607), PA11 (ATCC Accession No. HB-12608), PA12 (ATCC Accession No. HB-12609), and PA14 (ATCC Accession No. HB-12610).
- 25 30. The composition of claim 1 or 2, wherein the antibody is PA14 (ATCC Accession No. HB-12610).
- 30 31. The composition of claim 29, wherein the antibody is a monoclonal antibody.

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32. The composition of claim 29, wherein the monoclonal antibody is a human, humanized or chimeric antibody.
 33. The composition of claim 1 or 2, wherein the portion of the antibody is a Fab fragment of the antibody.
 34. The composition of claim 1 or 2, wherein the portion of the antibody comprises the variable domain of the antibody.
 35. The composition of claim 1 or 2, wherein the portion of the antibody comprises a CDR portion of the antibody.
 36. The composition of claim 31, wherein the monoclonal antibody is an IgG, IgM, IgD, IgA, or IgE monoclonal antibody.
 37. The composition of claim 1 or 2, wherein the relative mass ratio of each such compound in the admixture ranges from about 25:1 to about 1:1.
 38. The composition of claim 37, wherein the mass ratio is about 25:1.
 39. The composition of claim 37, wherein the mass ratio is about 5:1.
 40. The composition of claim 37, wherein the mass ratio is about 1:1.
 41. The composition of claim 1 or 2, wherein the composition is admixed with a carrier.

42. The composition of claim 41, wherein the carrier is an aerosol, intravenous, oral or topical carrier.

5 43. A method of inhibiting HIV-1 infection of a CD4+ cell which comprises contacting the CD4+ cell with an amount of the composition of claim 1 or 2 effective to inhibit HIV-1 infection of the CD4+ cell so as to thereby inhibit HIV-1 infection of the CD4+ cell.

10 44. The method of claim 43, wherein the CD4+ cell is present in a subject and the contacting is effected by administering the composition to the subject.

15 45. The method of claim 43, wherein the effective amount of the composition comprises from about 0.000001 mg/kg body weight to about 100 mg/kg body weight of the subject.

20 46. A method of inhibiting HIV-1 infection of a CD4+ cell which comprises contacting the CD4+ cell with (1) an amount of an antibody which binds to a CCR5 receptor and (2) an amount of a compound which retards gp41 from adopting a conformation capable of mediating fusion of HIV-1 to a CD4+ cell by binding noncovalently to an epitope on a gp41 fusion intermediate, so as to thereby inhibit HIV-1 infection of the CD4+ cell.

30 47. A method of inhibiting HIV-1 infection of a CD4+ cell which comprises contacting the CD4+ cell with (1) an amount of an antibody which binds to a CCR5 receptor, (2) an amount of a compound which retards attachment of HIV-1 to the CD4+ cell by retarding binding of HIV-1

gp120 envelope glycoprotein to CD4 on the surface of the CD4+ cell effective to inhibit HIV-1 infection of the CD4+ cell, and (3) an amount of a compound which retards gp41 from adopting a conformation capable of mediating fusion of HIV-1 to a CD4+ cell by binding noncovalently to an epitope on a gp41 fusion intermediate, so as to thereby inhibit HIV-1 infection of the CD4+ cell.

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10 (48) The method of claim 46 or 47, wherein the CD4+ cell is present in a subject and the contacting is effected by administering the compounds to the subject.

15 49. The method of claim 48, wherein the compounds are administered to the subject simultaneously.

50. The method of claim 48, wherein the compounds are administered to the subject at different times.

20 51. The method of claim 48, wherein the compounds are administered to the subject by different routes of administration.

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